WHAT IS CLAIMED IS:

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1. An image rendering system comprising:

a scanner that scans an image and produces image data;

an encoder that is coupled to the scanner and encodes the image data to provide encoded image data including anti-aliased grayscale text or lineart data that includes an identification of boundary pixels and associated pixel values; and

a decoder that is coupled to the encoder and decodes the encoded image data to provide decompressed data including anti-aliased text or lineart data and renders the decompressed data.

2. The image rendering system of claim 1, wherein the system implements an MRC image architecture.

3. The image rendering system of claim 1, further comprising memory that is coupled to the encoder and decoder and that stores the encoded image data, the memory being coupled to the decoder.

4. The image rendering system of claim 1, wherein the scanner scans an image and produces high resolution grayscale data, and wherein the encoder separates the grayscale pixels of the high resolution grayscale data into boundary pixels and non-boundary pixels, individually derives values of grayscale boundary pixels using the high resolution grayscale data, and stores the individually derived values of the grayscale boundary pixels.

5. The image rendering system of claim 4, wherein the encoder compresses the individually derived values of the grayscale boundary pixels as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

6. The image rendering system of claim 5, wherein the image data is color image data and a foreground image and a background image of the scanned image data are represented by low-resolution color data.

7. The image rendering system of claim 5, wherein, during compression, the encoder selects the boundary pixels from the scanned image data, quantizes the boundary pixels and analyzes each token as both a foreground layer and a boundary layer.

8. The image rendering system of claim 7, wherein the foreground layer and the boundary layer are compressed separately.

9. The image rendering system of claim 5, wherein only one set of boundary pixels is stored for each token.

10. The image rendering system of claim 6, wherein, for each high resolution color boundary pixel on a token, three colors are stored as three grayscale values.

11. The image rendering system of claim 10, wherein each grayscale value is computed as a fraction of an intensity between the foreground image and the background image.

12. The image rendering system of claim 10, wherein grayscale values of the boundary pixels are used to interpolate between foreground and background images during rendering of the image data.

13. The image rendering system of claim 12, wherein the three grayscale values are used for interpolation between foreground and background pixels on the boundary pixels of each instance of the token.

14. The image rendering system of claim 4, wherein the step of storing the individually derived values of the grayscale boundary pixels includes storing a full image mask corresponding to the scanned image data.

15. The image rendering system of claim 1, wherein the scanner scans the image and produces high resolution grayscale data and the encoder separates the grayscale pixels of the high resolution grayscale data into boundary pixels and non-boundary pixels, separates the grayscale boundary pixels into interior boundary pixels and exterior boundary pixels, determines boundary pixel connectedness for both the interior boundary pixels and the exterior boundary pixels, determines a representative grayscale value for the interior boundary pixels and a representative grayscale value for the exterior boundary pixels based on the connectedness of the interior boundary pixels and the exterior boundary pixels respectively and stores the grayscale values for the boundary pixels.

16. The image rendering system of claim 15, wherein the encoder stores the individually derived values of the grayscale boundary pixels by compressing the individually derived values of the grayscale boundary pixels as part of a set of grayscale

tokens that represent connected components in a foreground image that is part of the scanned image data.

17. The image rendering system of claim 1, wherein the scanner scans the image and produces high resolution binary data and the encoder individually estimates median boundary pixel values based on a number of oppositely colored four neighbor pixels to each of the boundary pixels and stores the estimated median boundary pixel values.

18. The image rendering system of claim 17, wherein the encoder stores the estimated median boundary pixel values by compressing the estimated median boundary pixel values as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

19. The image rendering system of claim 18, wherein the decoder performs rendering of the grayscale tokens by analyzing a connectivity of the boundary pixels and performing grayscale substitutions.

20. The image rendering system of claim 19, wherein substitution values used during performing grayscale substitutions are known a priori.

21. The image rendering system of claim 17, wherein the encoder stores the estimated median boundary pixel values by compressing the estimated median boundary pixel values as part of a foreground mask that represents connected components in a foreground image that is part of the scanned image data.

22. The image rendering system of claim 21, wherein the decoder performs rendering of the foreground mask by analyzing a connectivity of the boundary pixels and performing grayscale substitutions.

23. The image rendering system of claim 1, wherein the scanner scans the image and produces high resolution binary data and the encoder separates the boundary pixels into interior boundary pixels and exterior boundary pixels.

24. The image rendering system of claim 23, wherein the encoder determines a first global grayscale value corresponding to the interior boundary pixels and a second global grayscale value corresponding to the exterior boundary pixels and stores the interior and exterior boundary pixel data including the first and second grayscale boundary pixel values.

25. The image rendering system of claim 23, wherein the decoder stores default global grayscale values including first and second default global grayscale values and sets the interior boundary pixels to the first default global grayscale value and sets the exterior boundary pixels to the second global default grayscale value.

26. The image rendering system of claim 24, wherein the first and second default global values are determined based on analysis of image data other than the scanned image data.

27. The image rendering system of claim 23, wherein the decoder renders the image using the interior and exterior boundary pixel values and the binary high resolution data.

28. The image rendering system of claim 1, wherein the scanner scans the image and produces very high resolution binary data and the encoder converts the very high resolution binary data to high resolution grayscale data and stores the high resolution grayscale data.

29. The image rendering system of claim 28, wherein the encoder stores the high resolution grayscale data by compressing the high resolution grayscale data as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

30. An image rendering method comprising:

scanning an image to obtain scanned image data including text or lineart data;

generating an anti-aliased grayscale version of the text or lineart data including determining pixel values of the boundary pixels in the anti-aliased grayscale version of the scanned text or lineart data;

rendering the image using the determined pixel values.

31. The image rendering method of claim 30, wherein the step of scanning the image produces high resolution grayscale data and generating an anti-aliased grayscale version of the text or lineart data comprises:

separating the grayscale pixels of the high resolution grayscale data into boundary pixels and non-boundary pixels;

individually deriving values of grayscale boundary pixels using the high resolution grayscale data; and

storing the individually derived values of the grayscale boundary pixels.

32. The image rendering method of claim 31, wherein the step of storing the individually derived values of the grayscale boundary pixels includes compressing the individually derived values of the grayscale boundary pixels as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

33. The image rendering method of claim 32, wherein at least one of a token index, location, color, character and font ID and anti-aliasing information are stored with each token instance.

34. The image rendering method of claim 32, wherein the image data is color image data and a foreground image and a background image of the scanned image data are represented by low-resolution color data.

35. The image rendering method of claim 34, wherein, for each high resolution color boundary pixel on a token, three colors are stored as three grayscale values.

36. The image rendering method of claim 35, wherein each grayscale value is computed as a fraction of an intensity between the foreground image and the background image.

37. The image rendering method of claim 35, wherein grayscale values of the boundary pixels are used to interpolate between foreground and background images during rendering of the image data.

38. The image rendering method of claim 35, wherein the three grayscale values are used for interpolation between foreground and background pixels on the boundary pixels of each instance of the token.

39. The image rendering method of claim 31, wherein the step of storing the individually derived values of the grayscale boundary pixels includes storing a full image mask corresponding to the scanned image data.

40. The image rendering method of claim 30, wherein the step of scanning the image produces high resolution grayscale data and the step generating an anti-aliased grayscale version of the text or lineart data comprises:

separating the grayscale pixels of the high resolution grayscale data into boundary pixels and non-boundary pixels;

separating the grayscale boundary pixels into interior boundary pixels and exterior boundary pixels;

determining grayscale boundary pixel connectedness by separately analyzing the interior grayscale boundary pixels and the exterior grayscale boundary pixels;

individually deriving values of grayscale boundary pixels using the high resolution grayscale data and the determined grayscale boundary pixel connectedness; and

storing the individually derived values of the grayscale boundary pixels.

41. The image rendering method of claim 40, wherein the step of storing the individually derived values of the grayscale boundary pixels includes compressing the individually derived values of the grayscale boundary pixels as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

42. The image rendering method of claim 41, wherein at least one of a token index, location, color, character and font ID and anti-aliasing information are stored with each token instance.

43. The image rendering method of claim 41, wherein the step of rendering is performed by rendering grayscale tokens by analyzing a connectivity of the boundary pixels and performing grayscale substitutions.

44. The image rendering method of claim 30, wherein the step of scanning the image produces high resolution binary data and the step of generating an anti-aliased grayscale version of the text or lineart data comprises:

individually estimating median boundary pixel values based on a number of oppositely colored four neighbor pixels to each of the boundary pixels; and

storing the estimated median boundary pixel values.

45. The image rendering method of claim 44, wherein the step of storing the estimated median boundary pixel values stores the estimated median boundary pixel values as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

46. The image rendering method of claim 45, wherein at least one of a token index, location, color, character and font ID and anti-aliasing information are stored with each token instance.

47. The image rendering method of claim 45, wherein the step of rendering is performed by rendering the grayscale tokens by analyzing a connectivity of the boundary pixels and performing grayscale substitutions.

48. The image rendering method of claim 47, wherein substitution values used during performing grayscale substitutions are known a priori.

49. The image rendering method of claim 32, wherein the step of scanning the image produces high resolution binary data and the step of generating an anti-aliased grayscale version of the text or lineart data comprises:

separating the boundary pixels into interior boundary pixels and exterior boundary pixels;

determining a first global grayscale value corresponding to the interior boundary pixels and a second global grayscale value corresponding to the exterior boundary pixels; and

storing the interior and exterior boundary pixel data including the first and second grayscale boundary pixel values.

50. The image rendering method of claim 49, wherein the step of storing the interior and exterior boundary pixel data stores the interior and exterior boundary pixel data as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

51. The image rendering method of claim 50, wherein at least one of a token index, location, color, character and font ID and anti-aliasing information are stored with each token instance.

52. The image rendering system of claim 49, further comprising storing default global grayscale values including first and second default global grayscale values and setting the interior boundary pixels to the first default global grayscale value and setting the exterior boundary pixels to the second default global grayscale value.

53. The image rendering system of claim 52, wherein the first and second default global values are determined based on analysis of image data other than the scanned image data.

54. The image rendering method of claim 49, further comprising rendering the image using the interior and exterior boundary pixel values and the binary high resolution data.

55. The image rendering method of claim 30, wherein the step of scanning the image produces very high resolution binary data and the step of generating an anti-aliased grayscale version of the text or lineart data comprises:

converting the very high resolution binary data to high resolution grayscale data; and

storing the high resolution grayscale data.

56. The image rendering method of claim 55, wherein the step of storing the high resolution grayscale data includes compressing the high resolution grayscale data as part of a set of grayscale tokens that represent connected components in a foreground image that is part of the scanned image data.

57. The image rendering method of claim 56, wherein at least one of a token index, location, color, character and font ID and anti-aliasing information are stored with each token instance.

58. The image rendering method of claim 55, wherein the converting step is performed by filtering and down sampling the very high resolution binary text or lineart data to produce high resolution grayscale text or lineart data.

59. The image rendering method of claim 58, wherein the step of filtering and down sampling comprises:

tiling the very high resolution binary text or lineart data prior to subsampling the very high resolution binary text or lineart data, and calculating a gray value for each tile that is proportional to the number of pixels of a first value in the tile.

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